

NOTE

Additions and Amendments to the Benthic Marine Algal Flora of Fiji, Including the Island of Rotuma

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Abstract—Fifty-two new records of benthic marine algae from the Fiji Islands (including the first algal records from the island of Rotuma) are reported, comprising 16 Cyanophyceae, 8 Chlorophyceae, 5 Phaeophyceae, and 23 Rhodophyceae. Included among the new records are species found for the first time at sites other than the type locality (*Streblonema minutulum* Heydrich described from Papua New Guinea, and *Meristotheca procumbens* P. Gabrielson et Kraft, described from Lord Howe Island), and others showing a disjunct northern-southern hemisphere distribution [e.g. *Phaeophila dendroides* (P. Crouan et H. Crouan) Batters, and *Rosenvingea orientalis* (J. Agardh) Børgesen]. With this list and previously published reports, a total of 383 species of benthic algae is now known from Fiji; on-going studies indicate that this might represent 65–70% of the flora; the cyanophycean flora is especially rich and as yet inadequately described.

Introduction

South & Kasahara (1992) listed a total of 314 benthic marine algae recorded from the Fiji Islands; since then an additional ten taxa have been reported (South, 1991; 1993; South & N'Yeurt, 1993), bringing the total to 324. Recent studies from the Great Astrolabe Reef (Littler & Littler, pers. comm.), Rotuma (N'Yeurt, 1993) and other localities in Fiji, as well as a study of mangrove-associated algae on Viti Levu (Raj, 1993) have resulted in numerous new records, indicating that the flora is much richer than earlier reports suggested.

In this paper we report fifty-two new records of benthic marine algae from Fiji (including Rotuma), and an additional seven taxa listed in Garbary et al. (1991) and omitted from South & Kasahara (1992). Full details of the records from the Island of Rotuma are given in N'Yeurt (1993); these represent the first collections from this isolated location. Raj (1993) reports in detail on the mangrove-associated species.

Materials and Methods

Collecting sites for species listed here are shown in Figure 1. Specimens were obtained with the aid of SCUBA, or by snorkeling, reef walking or examination of scrapings from mangrove pneumatophores. Specimens were preserved in 3–5% formaldehyde in sea water and returned to the laboratory for detailed examination. Voucher specimens are retained as microscope slides, herbarium specimens or liquid-preserved specimens and are housed in the Phycological Herbarium, South Pacific Regional Herbarium, Suva, Fiji (USP). Camera lucida drawings were made with the aid of an Abbé Drawing Tube (Carl Zeiss) and photomicrographs were taken with a Zeiss Photoscope III.

Results

SYSTEMATIC LIST

The arrangement of the list follows that of Silva et al. (1987) where appropriate, and is the same as that adopted in South & Kasahara (1992). In addition to new records, seven species reported by Garbary et al. (1991) and omitted from

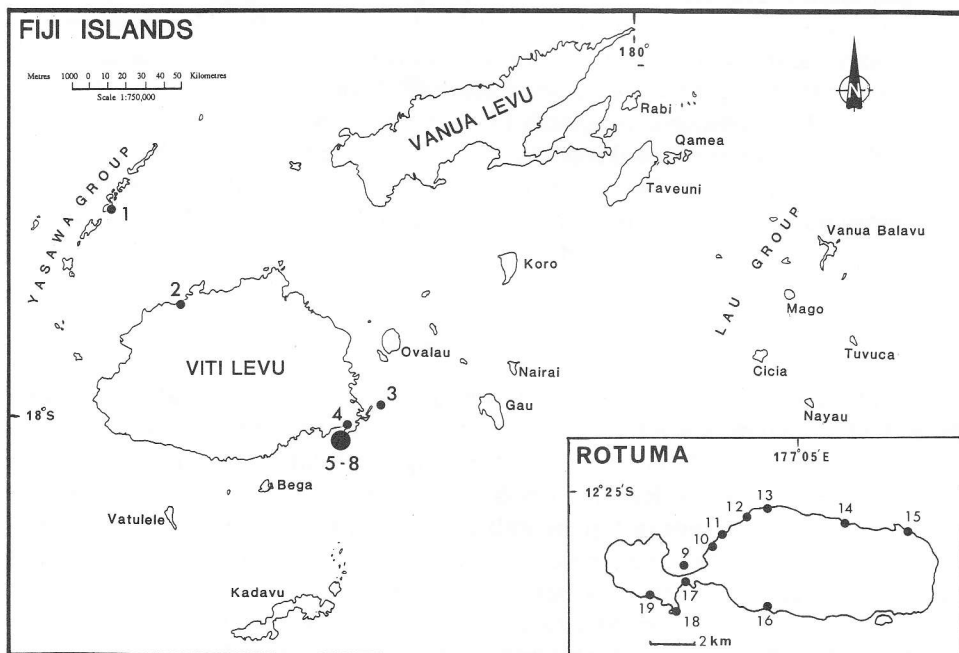


Figure 1. Map of the Fiji Islands, with Rotuma (Inset), showing locations where samples were collected. 1. Yageta Island; 2. Ba River; 3. Toberua Passage; 4. Rewa River; 5. Suva Lagoon; 6. Nukulau Island; 7. Makuluva Island; 8. Nukulau Channel; 9. Maka Bay; 10. Ahau; 11. Jolmea; 12. Ropure; 13. Hafea; 14. Lopta; 15. Oinafa; 16. Tuakoi; 17. Hapmafau; 18. Kilinga; 19. Fapufa.

South & Kasahara (1992) are also included. These omissions were a result of changes in Garbary et al. (1991) following revision of their manuscript, and not seen by South & Kasahara (1992) until after the publication of both lists. Records from Fiji proper, including those of Raj (1993) are described here in full. Those from Rotuma are limited to mention of representative material and information on distribution: descriptions and illustrations are given in N'Yeurt (1993) and will be published elsewhere. Accession numbers to specimens housed in the Phycological Herbarium, South Pacific Regional Herbarium are given wherever possible; numbers beginning with "S" refer to slide collections.

CYANOPHYCEAE

CHROOCOCCALES

Chroococcaceae

Aphanocapsa Nägeli

Aphanocapsa sp.

REPRESENTATIVE MATERIAL: Ahau, Rotuma [N'Yeurt, 10th Feb., 1993: USP S3:12].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970).

Gomphosphaeria Kützing

Gomphosphaeria sp.

REPRESENTATIVE MATERIAL: Ahau, Rotuma [N'Yeurt, 10th Feb., 1993: USPS3:12].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970).

Entophysalidaceae

Entophysalis Kützing

Entophysalis sp.

REPRESENTATIVE MATERIAL: Ahau, Rotuma [N'Yeurt, 10th Feb, 1993: USP S3:12].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970).

PLEUROCAPSALES

Hyellaceae

Dermocarpa P. Crouan et H. Crouan

Dermocarpa sp.

REPRESENTATIVE MATERIAL: Ahau, Rotuma [N'Yeurt, 10th Feb, 1993: USP S3:12].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970).

Oncobyrsa Meneghini

[= *Hydrococcus* sensu Bourrelly, 1970]

Oncobyrsa sp.

REPRESENTATIVE MATERIAL: Ahau, Rotuma [N'Yeurt, 10th Feb, 1993: USP S3:12].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970).

Pleurocapsa Thuret ex Hauck*Pleurocapsa* sp.

REPRESENTATIVE MATERIAL: Ahau, Rotuma [*N'Yeurt*, 10th Feb, 1993: USP S3:12].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970).

CHAMAESIPHONALES

Chamaesiphonaceae**Chamaesiphon** A. Braun et Grunow*Chamaesiphon* sp.

REPRESENTATIVE MATERIAL: Lopta, Rotuma [*N'Yeurt*, 18th Mar., 1992: USP S4:1].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970).

Siphononemataceae**Siphononema** Geitler*S. polonicum* Geitler

REPRESENTATIVE MATERIAL: Lopta, Rotuma [*N'Yeurt*, 18th Mar., 1992: USP S4:1].

DISTRIBUTION: Europe (Bourrelly, 1970:342, pl. 89 figs. 14–16).

NOSTOCALES

Nostocaceae**Anabaena** Bory de St. Vincent*Anabaena* sp.

REPRESENTATIVE MATERIAL: Ahau, Rotuma [*N'Yeurt*, 10th Feb, 1993: USP S3:12].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970).

Oscillatoriaceae**Lyngbya** C. Agardh*L. aestuarii* (Mertens) Liebermann

REPRESENTATIVE MATERIAL: Hapmafau, Rotuma [*N'Yeurt*, 10th Mar., 1992: USP S4:2].

DISTRIBUTION: Cosmopolitan (Lindstedt 1943: 82, pl. 10 figs. 3–4).

Oscillatoria Vaucher*Oscillatoria* sp.

REPRESENTATIVE MATERIAL: Ahau, Rotuma [*N'Yeurt*, 10th Feb, 1993: USP S3:12].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970).

Schizothrix Kützing*Schizothrix* sp.

REPRESENTATIVE MATERIAL: Hapmafau, Rotuma [*N'Yeurt*, 10th Mar., 1992: USP S3:16].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970).

Spirulina Turpin*S. tenerima* Kützing

REPRESENTATIVE MATERIAL: Hafea, Rotuma [*N'Yeurt*, 5th Mar., 1992: USP S3:17].

DISTRIBUTION: Cosmopolitan (Lindstedt 1943: 55, pl. 6 figs. 12–13).

S. subtilestissima Kützting

REPRESENTATIVE MATERIAL: Ropure, Rotuma [*N'Yeurt*, 28th Jan., 1993: USP S3:14].

DISTRIBUTION: Cosmopolitan (Lindstedt 1943: 55, pl. 6 figs. 10–11; Dawson 1957: 128, fig. 311; Umezaki 1961: 65, pl. 10 fig. 7; Tsuda and Wray 1977: 92; Payri and Meinesz 1985a: 504).

Rivulariaceae

Homeothrix (Thuret) Kirchner

Homeothrix sp.

REPRESENTATIVE MATERIAL: Lopta, Rotuma [*N'Yeurt*, 18th Mar., 1992: USP S4:1].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970:).

Scytonmenataceae

Plectonema Thuret

Plectonema sp.

REPRESENTATIVE MATERIAL: Tuakoi, Rotuma [*N'Yeurt*, 26th Dec., 1992: USP S3:13].

DISTRIBUTION: Cosmopolitan (Bourrelly, 1970:).

Scytonema C. Agardh

Scytonema hofman-bangii C. Agardh

[Garbary et al., 1991]

CHLOROPHYCEAE

CTENOCLADALES

Ulvellaceae

Acrochaete N. Pringsheim

A. viridis (Reinke) R. Nielsen

[Garbary et al., 1991]

Phaeophila Hauck

P. dendroides (P. Crouan et H. Crouan) Batters

Figure 2.

REPRESENTATIVE MATERIAL: Bega Lagoon (ex Suva Municipal Market) [*South*, 12th Oct., 1992; USP S1:9]

Endophytic in the thallus of *Hypnea pannosa* J. Agardh, a species regularly collected for human consumption (South, 1993). Filaments penetrate the inter-cellular spaces of the host, the uppermost lying close to or at the host surface and producing numerous unsheathed hairs from the dorsal surface. Chloroplast parietal, cells containing 1–2 pyrenoids.

DISTRIBUTION: Beqa, Fiji; Northeastern N. America and eastern tropical N. America (Taylor, 1957; 1960); Seychelles Islands (Cœtivy Is.; Kalogina-Gutnik et al., 1992: 17).

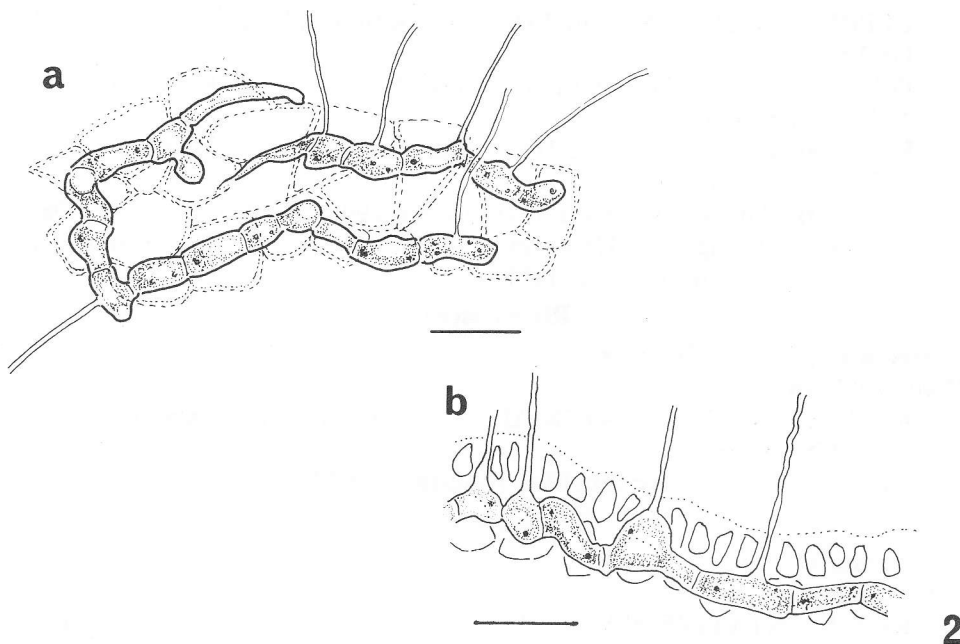


Figure 2. *Phaeophila dendroides* endophytic in *Hypnea pannosa*. a. Viewed from the surface. b. Cross section of host showing filaments, with hair cells positioned between epidermal cells and emerging above the host surface. Scales = 50 μ m.

CLADOPHORALES

Cladophoraceae

Cladophora Kützing

C. conferta P. Crouan et H. Crouan

REPRESENTATIVE MATERIAL: Jolmea, Rotuma [*N'Yeurt*, 21st Jan., 1993: USP 440].

DISTRIBUTION: Tropical Atlantic (van den Hoek 1982: 173, figs. 332–354); Philippines (Silva et al. 1987:97); Rotuma.

Rhizoclonium Kützing

R. africanum Kützing

REPRESENTATIVE MATERIAL: Hapmafau, Rotuma [*N'Yeurt*, 3rd Feb., 1993: USP 448].

DISTRIBUTION: Solomon Islands (Womersley & Bailey 1970: 265); Northern Australia (Lewis 1987: 15); Philippines (Silva et al. 1987: 99); Rotuma.

R. grande Børgesen

REPRESENTATIVE MATERIAL: Hapmafau, Rotuma [*N'Yeurt*, 17th Mar., 1992: USP S4:5].

DISTRIBUTION: India (Børgesen 1935: 14, figs. 5–6); Tanzania (Jaasund 1976:5, fig. 12); Philippines (Silva et al. 1987: 99); Japan (Tsuda 1991: 43); Rotuma.

SIPHONOCCLADALES

Siphonocladaceae

Cladophoropsis Børgesen

C. sundanensis Reinbold

REPRESENTATIVE MATERIAL: Ba and Rewa Delta, Viti Levu (Raj, 1993: USP S3:7); Fapufa, Rotuma [*N'Yeurt*, 12 Dec., 1991: USP S447; 21 Apr., 1992: USP S4:6].

DISTRIBUTION: Solomon Islands (Womersley & Bailey 1970: 268); Tanzania (Jaasund 1976: 11, fig. 24); Micronesia (Tsuda & Wray 1977: 96); China (Meiling & Tseng 1984: 274, pl. 136 fig. 1); Tahiti (Payri & Meinesz 1985a: 509); Australia (Lewis 1987: 10 ["sudanensis"]); Philippines (Silva et al. 1987: 101); Rotuma.

BRYOPSIDALES

Bryopsidaceae

Bryopsis Lamouroux

B. plumosa (Hudson) C. Agardh

REPRESENTATIVE MATERIAL: Hapmafau, Rotuma [*N'Yeurt*, 22nd May, 1992: USP 337; USP 338].

DISTRIBUTION: Lord Howe Island (Lucas 1935: 198); Tropical America (Taylor 1960: 131, pl. 9 fig. 11); Micronesia (Tsuda & Wray 1977: 94); Philippines (Silva et al. 1987: 103); New Caledonia (Garrigue & Tsuda 1988: 57); Rotuma.

Halimediaceae

Halimeda Lamouroux

H. micronesica Yamada

REPRESENTATIVE MATERIAL: Oinafa, Rotuma [*N'Yeurt*, 19th Mar., 1992: USP 394, 396; 17th May, 1992: USP 395].

DISTRIBUTION: Solomon Islands (Womersley & Bailey 1970: 282); Micronesia (Tsuda & Wray 1977: 98); China (Meiling & Tseng 1984: 290, pl. 144, fig. 1); Polynesia (Payri & Meinesz 1985b: 643, figs. 16, 18, 24, 46); Rotuma.

Udoteaceae

Chlorodesmis Harvey ex Bailey

C. major Zanardini

REPRESENTATIVE MATERIAL: Hapmafau, Rotuma [*N'Yeurt*, 10th Mar., 1992: USP 340].

DISTRIBUTION: Lord Howe Island (Lucas 1935: 200); Hawaii (Egerod 1952: 377, fig. 9c); Northern Australia (Lewis 1987: 27); Philippines (Silva et al. 1987: 118); Rotuma.

Rhipiliopsis A. Gepp et E. S. Gepp

Rhipiliopsis sp.

[Garbary et al., 1991]

DASYCLADALES

Polyphysaceae

Acetabularia Lamouroux*A. parvula* Solms-Laubach[Garbary et al., 1991 (as *A. moebii* Solms-Laubach)]

PHAEOPHYCEAE

ECTOCARPALES

Ectocarpaceae

Feldmannia Hamel*F. columellaris* (Børgesen) Islam

[Garbary et al., 1991]

Hincksia J. E. Gray*H. breviarticulata* (J. Agardh) P. C. Silva[=*Ectocarpus breviarticulata* J. Agardh; see Silva et al. 1987: 73].

REPRESENTATIVE MATERIAL: Lopta, Rotuma [N'Yeurt, 18th Mar., 1992: USP 357].

DISTRIBUTION: Philippines (Silva et al. 1987: 73); Hawaii (Abbott 1989: 226); Solomon Islands (Womersley & Bailey 1970: 288); Micronesia (Tsuda & Wray 1977: 101); China (Baoren & Tseng 1984: 168, pl. 85 fig. 1); Northern Australia (Lewis 1985: 3); Polynesia (Payri & Meinesz 1985: 505); Nauru (South & Yen 1992: 128); Rotuma.

Streblonema Derbès et Solier in Castagne*S. minutulum* Heydrich

Fig. 3.

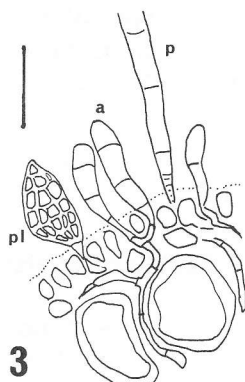
Heydrich, 1892: 471, pl. 26, fig. 15; Kuckuck, 1954: 110–111, fig. 5. [type locality: Papua New Guinea, endophytic in *Sebdenia ceylandica*]

Figure 3. *Streblonema minutulum* endophytic in the outer layers of *Soliera robusta*. Narrow hypha-like filaments penetrate the host intercellular spaces; emergent are assimilators (a), phaeophycean hairs (p) and plurilocular sporangia (pl). Scale = 50 μ m.

REPRESENTATIVE MATERIAL: Suva Lagoon, Viti Levu (ex Suva Municipal Market) [South, 12th Oct., 1992; USP S1:8]. Endophytic in *Solieria robusta* (Greville) Kylin. Specimens bore plurilocular sporangia, phaeophycean hairs and short vegetative filaments of 3–4 cells emergent above the host surface. Endophytic basal filaments more or less colourless, narrow, frequently branched and forming a network between the host cortical cells. Plants closely resemble those illustrated in Kuckuck (1954, fig. 5).

DISTRIBUTION: Papua New Guinea; Fiji.

DICTYOTALES

Dictyotopsidae

Dictyotopsis Troll

D. propagulifera Troll

Troll, 1931: 474, figs. 4–18 [type locality Island of Belawan, Indonesia]; Post, 1967: 279; Farrant & King, 1989: 369; King, 1990: 58.

REPRESENTATIVE MATERIAL: Ba, Rewa Delta, Viti Levu [Raj, 1992; USP S2:17]

Occurs in the upper, drier region of the mangal, and was present on all mangrove species examined in the Rewa River Delta, Viti Levu, but only on *Rhizophora samoensis* (Hochr.) Salvoza and *R. stylosa* Griff. pneumatophores in the Ba River, Viti Levu (Raj, 1993: 64). The single apical cells segment laterally, and the thallus is monostromatic.

DISTRIBUTION: Indonesia; Fiji (first recorded in Post, 1967); Australia (New South Wales; Farrant and King, 1989); Fiji.

DICTYOSIPHONALES

Chnoosporaceae

Chnoospora J. Agardh

C. minima (Hering) Papenfuss

REPRESENTATIVE MATERIAL: Lopta, Rotuma [N'Yeurt, 18th Mar., 1992: USP 358; 15 Dec., 1992: USP 478, 479].

DISTRIBUTION: Solomon Islands (Womersley & Bailey 1970: 293); Hawaii (Abbott 1989: 227); China (Baoren & Tseng 1984: 184, pl. 93 fig. 2; Northern Australia (Lewis 1985: 8); Rotuma.

SCYTOSIPHONALES

Scytosiphonaceae

Rosenvingea Børgesen

R. orientalis (J. Agardh) Børgesen

Fig. 4.

Børgesen, 1914: 26.

Asperococcus orientalis J. Agardh, 1848: 78 [type locality Manila, Luzon, Philippines]. For nomenclature and synonymy, see Silva et al. (1987: 80).

REPRESENTATIVE MATERIAL: Known from only a single specimen in Fiji, from Nukulau Is., Suva Lagoon [South, 9 Sept., 1991; USP 232].

In a silty channel between Nukulau and Makaluva Islands, Suva Lagoon, Viti Levu, just below low tide level and attached by small discoid holdfasts to a fragment of dead *Acropora* coral. Plants to 18cm tall, branching frequent, dichotomous to subdichotomous, terminating in fine, sharply attenuated tips. Thallus hollow, phaeophycean hairs numerous; cortex of 1–2 layers of isodiametric—angular cells, epidermis single-layered. Fertile plants not found.

DISTRIBUTION: Philippines (Silva et al., 1987: 80); Eniwetok Atoll (Dawson 1957); Fiji.

RHODOPHYCEAE

Florideophycidae

ACROCHAETIALES

Acrochaetiaceae

Audouinella Børy

A. polyblasta (Rosenvinge) J. Price, Lawson et John

[= *Acrochaetium sargassi* Børgesen, vide Woelkerling 1973: 84]

REPRESENTATIVE MATERIAL: Hapmafau, Rotuma [*N'Yeurt*, 10th Mar., 1992: USP S4:7].

DISTRIBUTION: North America (South & Tittley 1986:3) Indonesia (Weber-van Bosse 1921: 193, as *Acrochaetium sargassi* Børgesen); Solomon Islands (Womersley & Bailey 1970: 301, as *Acrochaetium sargassi* Børgesen); Rotuma.

A. saviana (Meneghini) Woelkerling

Woelkerling, 1973: 560, figs. 56–60.

For nomenclature and synonymy, see Woelkerling (1973).

REPRESENTATIVE MATERIAL: Suva Lagoon [*South*, 8th April, 1993: USP568].

An abundant epiphyte on the leaves of the seagrass *Halodule uninervis* (Forsskål) Ascherson and on the filaments of *Chaetomorpha crassa* (C. Agardh) Kützinger. Plants to 500 µm tall, the original spore non-persistent; prostrate system as a limited, pseudo-parenchymatous disk; erect filaments freely, irregularly branched, unicellular hairs lacking; chloroplast single, parietal and one pyrenoid present; monosporangia frequent, single, in second series along the laterals, sessile or stalked.

DISTRIBUTION: Nearly cosmopolitan (Woelkerling 1973: 561).

GELIDIALES

Gelidiaceae

Gelidium Lamouroux

G. crinale (Turner) Gaillon

var. *perpusillum* Piccone et Grunow

Piccone, 1884: 317 [type locality: Massawa, Ethiopia]

REPRESENTATIVE MATERIAL: Ba and Rewa Rivers, Viti Levu [*Raj*,

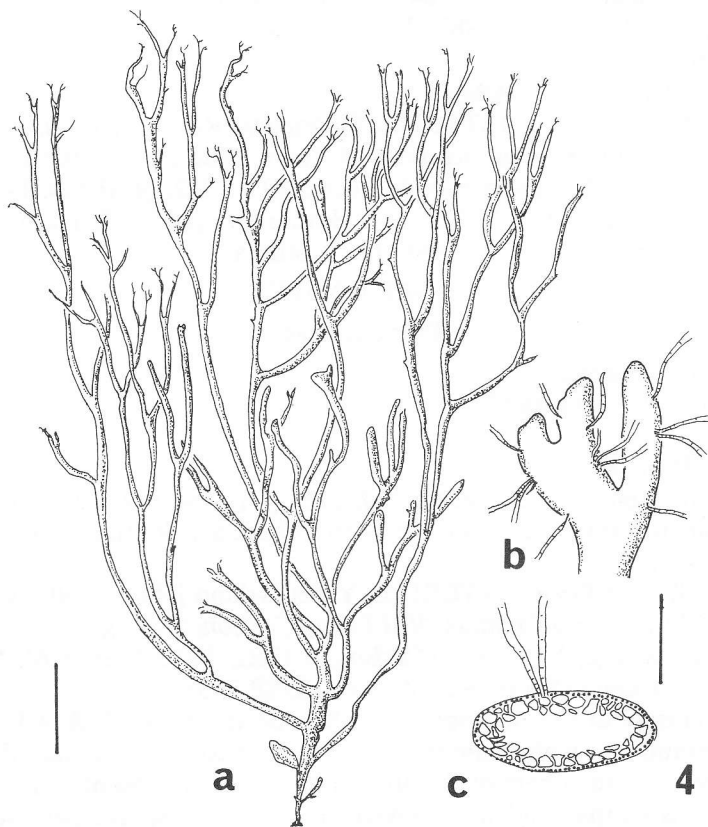


Figure 4. *Rosenvingea orientalis*, showing habit (a), an apical region with phaeophyceous hairs (b) and a cross section showing the hollow thallus (c). Scales (a) = 2.0 cm, (b), (c) = 0.5 mm.

1993; S2:12].

Found on the pneumatophores of all mangrove species examined (Raj, 1993: 56).

DISTRIBUTION: A general tropical distribution; Indonesia (Tanaka & Chihara, 1988a, b); Fiji.

CORALLINALES

Corallinaceae

Jania Lamouroux

J. rubens (Linnaeus) Lamouroux

REPRESENTATIVE MATERIAL: Lopta, Rotuma [N'Yeurt, 15 Dec., 1992: USP 559].

DISTRIBUTION: Solomon Islands (Womersley & Bailey 1970: 314); Greece (Haritonidis & Tsekos 1976: 281); Micronesia (Tsuda & Wray 1977: 108);

Northern Australia (Lewis 1984: 15); Polynesia (Payri & Meinesz 1985: 513); Philippines (Silva et al. 1987: 35); Rotuma.

Mesopyhyllum Lemoine

M. mesomorphum (Foslie) Adey

REPRESENTATIVE MATERIAL: Hapmafau, Rotuma [*N'Yeurt*, 10th Mar., 1992: USP 450]; Kilinga, Rotuma [*N'Yeurt*, 22nd Dec., 1992: USP 440].

DISTRIBUTION: Guam (Gordon et al. 1976: 252, pl. II figs. 1-3); Micronesia (Tsuda & Wray 1977: 110); Hawaii (Magruder & Hunt 1979: 85); Northern Australia (Lewis 1984: 17); Rotuma.

GIGARTINALES

Plocamiaceae

Plocamium Lamouroux

P. cartilagineum (Linnaeus) Dixon

Fig. 5.

Dixon, 1967: 58.

Fucus cartilagineus Linnaeus, 1753: 1161 [type locality: northern Europe]. For nomenclature, synonymy and description, see South and Adams, 1979: 124, figs. 2, 11-15.

REPRESENTATIVE MATERIAL: Yageta Island [*Würtz*, 19th Sept., 1992; USP 567]; Nukulau Channel, Viti Levu [*Carlson*, 20 Aug., 1972; USP 314]; Toberua Passage, Viti Levu [*Carlson*, 3 Dec., 1972; USP 316]; Makuluva Island, Viti Levu [*South*, 9 Sept., 1991; USP 315].

Plants closely fit the description of this species in South & Adams (1979: 124); ramuli are in alternate series of 3-4, and adventitious ramuli opposite to or between members of the alternating series are absent. The lowermost ramulus is simple, and not hooked in form. Tetrasporangial stichidia are pedicellate in the axils of ramuli, or grouped on the upper margins of ramuli and along the axis; they are at first simple, becoming branched and elongate. DISTRIBUTION: According to Womersley (1971) this is the only very widespread species of *Plocamium*, being recorded from many temperate seas; its presence in Fiji is thus of interest. Occurs throughout New Zealand and extends as far south as Antarctica (South & Adams, 1979: 125); also occurs in Europe, N. America and Australia (Womersley, 1971: 24). Previous records of *Plocamium* from Fiji have been attributed to *P. abnorme* Hooker fil. et Harvey (South & Kasahara, 1992: 62), a species later placed in synonymy with *P. angustum* (J. Agardh) Hooker fil. et Harvey (South & Adams, 1979: 121). Tetrasporic collections from these sites are needed to re-examine these records in the light of this report of *P. cartilagineum*.

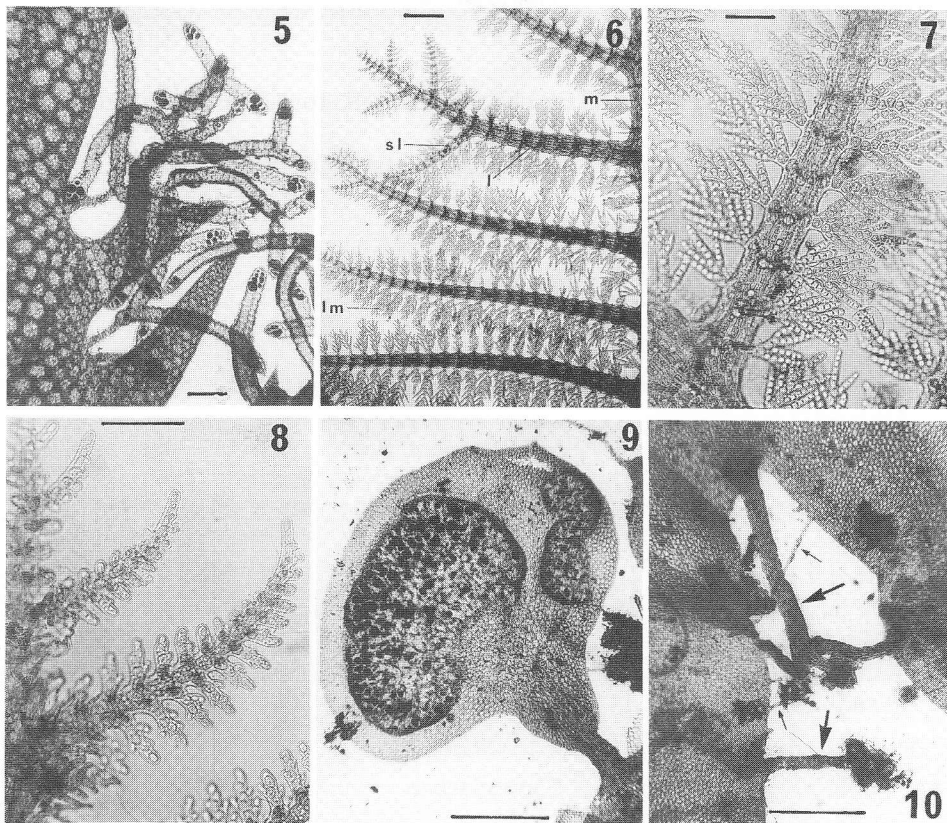
Gracilariaceae

Gracilaria Greville

G. arcuata Zanardini

REPRESENTATIVE MATERIAL: Lopta, Rotuma [*N'Yeurt*, 18th Mar., 1992: USP 349].

DISTRIBUTION: Indonesia (Weber-van Bosse 1928: 429, fig. 173); Tan-



Figures 5–10. Figure 5. *Plocamium cartilagineum* showing elongate, branched tetrasporangial stichidia. Scale = 50 μ m. Figure 6. *Dasyphila plumarioides*. Lateral branches (l) are borne on the main axis (m), in alternate series; these may bear secondary laterals of unlimited growth (sl) also alternately arranged, and uniseriate, alternately branched laterals of limited growth (lm) arranged in distichous, opposite pairs. Scale = 50 μ m. Figure 7. *Dasyphila plumarioides*. Details of lateral branch with opposite pairs of branches of limited growth; dorsal and ventral branches are suppressed. Scale = 50 μ m. Figure 8. *Dasyphila plumarioides*. Apices of ultimate branchlets, showing that initial development of laterals is on the lower side of branches, becoming even towards the base. Scale = 50 μ m. Figure 9. *Myriogramme* sp. showing foliose lateral and tetrasporangial sori. Scale = 500 μ m. Figure 10. *Myriogramme* sp. showing monostromatic thallus bearing uniseriate rhizoids (small arrows) and multiserial haptera with terminal rhizoids (large arrows). Scale = 500 μ m.

zania (Jaasund 1976: 85, fig. 173); Micronesia (Tsuda & Wray 1977: 106); Northern Australia (Lewis 1984: 24); China (Tseng et al. 1984: 102, pl. 54 fig. 1); Philippines (Silva et al. 1987: 40); New Caledonia (Garrigue & Tsuda 1988: 65); Rotuma.

Solieriaceae**Meristotheca** J. Agardh*M. procumbens* P. Gabrielson et Kraft

REPRESENTATIVE MATERIAL: Tuakoi, Rotuma [*N'Yeurt*, 2nd Mar., 1992: USP 351].

DISTRIBUTION: Lord Howe Island (Gabrielson & Kraft 1984: 241, fig. 14A-D); Rotuma.

RHODYMENIALES**Rhodymeniaceae****Coelarthrum** Børgesen*C. boergesenii* Weber-van Bosse

REPRESENTATIVE MATERIAL: Ropure, Rotuma [*N'Yeurt*, 28 Jan., 1993: USP 441].

DISTRIBUTION: Indonesia (Weber-van Bosse 1928: 473, figs. 207-208); Micronesia (Tsuda & Wray 1977: 105); Northern Australia (Lewis 1984: 37); Hawaii (Abbott 1989: 229); Japan (Tsuda 1991: 50); Rotuma.

Rhodymenia Greville*R. divaricata* Dawson

REPRESENTATIVE MATERIAL: Maka, Rotuma [*N'Yeurt*, 17th Feb., 1992: USP 352, 353].

DISTRIBUTION: Mexico (Dawson 1941: 141, pl. 23 fig. 31) Micronesia (Tsuda & Wray 1977: 111); Rotuma.

CERAMIALES**Ceramiaceae****Centroceras** Kützing*C. apiculatum* Yamada

[Garbary et al., 1991]

Ceramiella Børgesen*Ceramiella* sp.

REPRESENTATIVE MATERIAL: Hapmafau, Rotuma [*N'Yeurt*, 10th Mar., 1992: USP S4:10, S4:11, S4:12]; Jolmea, Rotuma [*N'Yeurt*, 28th Jan., 1993: USP S4:9].

DISTRIBUTION: Indonesia (Weber-van Bosse 1923: 322); Philippines (Silva et al. 1987: 54); Rotuma.

Ceramium Roth*C. mazatlanense* Dawson

[Garbary et al., 1991]

C. zaca Setchell et Gardner

REPRESENTATIVE MATERIAL: Hapmafau, Rotuma [*N'Yeurt*, 10th Mar., 1992: USP S4:8].

DISTRIBUTION: Mexico (Dawson 1950: 134, pl. 2 figs. 27-28); Ewinetok Atoll, Micronesia (Dawson 1957: 8); Philippines (Fortes & Trono 1979: 60, fig. 11; Silva et al. 1987: 56); Rotuma.

C. codii (Richards) Feldmann-Mazoyer

REPRESENTATIVE MATERIAL: Hafea, Rotuma [N'Yeurt, 5th May., 1992: USP S4:14].

DISTRIBUTION: Bermuda (Richards 1901:264, pls. 21–22); Tanzania (Jaasund 1970b: 68, fig. 1, F, N; 1976: 107, fig. 216); Australia (Cribb 1983: 80, pl. 27 figs. 1–4; Lewis 1984: 41; Millar 1990: 393, figs. 41D–F; 43B; Price & Scott 1992: 86, fig. 26A–D); Rotuma.

Dasyphila Sonder

Figs. 6–8.

D. plumarioides Yendo

Yendo, 1920: 7 [type locality Kotosho (Hung-t'ou), Taiwan]. Okamura, 1923: 198, Figs. 5–11; 1931: 52, pl. 277, fig. 11; Womersley and Bailey, 1970: 326, fig. 9; Silva et al., 1987: 56; Lewis and Norris, 1987: 22.

REPRESENTATIVE MATERIAL Yageta Island [Würtz, 17th Sept., 1992; USP 566].

Plants from Fiji exactly fit the description in Womersley and Bailey (1970) and the figures in Okamura (1923, 1931). To date, only sterile plants have been found, in a single collection.

DISTRIBUTION: Taiwan, Philippines, Solomon Islands, Fiji.

Delesseriaceae

Caloglossa (Harvey) J. Agardh

See recent discussion of *Caloglossa* in Sheath et al. (1993: 113).

Caloglossa sp. 1 inedit

This species resembles *Caloglossa adnata* (Zanardini) De Toni previously recorded from Fiji (Chapman, 1971; South & Kasahara, 1992: 64). As stated in Raj (1993), however, it differs in the location of the rhizoids, which are formed on any cell of the blade compared with *C. adnata*, where they are produced in groups along the midrib only. King & Puttock (pers. comm.) are in process of describing this as a new species (*C. adhaerens* sp. inedit.) in a forthcoming revision of the genus. The occurrence of *Caloglossa adnata* in Fiji should be reviewed in the light of this.

Caloglossa sp. 2 inedit

This species also resembles *Caloglossa adnata*, but will be described as a new species (*C. bengalensis* sp. inedit.) by King & Puttock in their forthcoming revision of the genus.

Hypoglossum Kützting*H. caloglossoides* Wynne et Kraft

REPRESENTATIVE MATERIAL: Tuakoi, Rotuma [N'Yeurt, 2nd May., 1992: USP S4:13].

DISTRIBUTION: Lord Howe Island (Wynne and Kraft 1985: 20, figs. 1–19); Australia (Price and Scott 1992: 137, fig. 47A–C); Rotuma.

Myriogramme Kylin*Myriogramme* sp.

Figs. 9, 10.

REPRESENTATIVE MATERIAL: Yageta Island [Würtz, 17th Sept. 1992: USP 581; S1:7].

Small plants creeping on the base of *Halimeda*, at a depth of 17 m. Thallus monostromatic, lacking veins or nerves, branching irregular, growth from the margins, diffuse; attachment by multicellular, sometimes robust holdfasts produced from the thallus margins, terminating in multicellular rhizoids; tetrasporangia tetrahedrally divided, in oval or lunate sori on foliose laterals, or in the marginal areas of the main thallus. This may represent an undescribed species.

Rhodomelaceae

Bostrychia Montagne¹

B. simpliciuscula Harvey ex J. Agardh

Agardh 1863: 854 [type locality, Tonga].

REPRESENTATIVE MATERIAL: Ba and Rewa Rivers, Viti Levu [Raj, 1992: USP S2:13]

In Fiji, epiphytic on mangrove pneumatophores, and also occurs as mats on mud in tidal inlets and rivers (Raj 1993). The main axes are polysiphonous and ecorticate, and the ultimate branches are partially monosiphonous. Older prostrate axes have few non layer-forming cortical cells as compared with *B. mortiziana* (Sonder ex Kützinger) J. Agardh and *B. radicans* (Montagne) Montagne in Orbigny. The holdfasts are formed from adventitious cortication of pericentral cells (peripherohaptera) and the later branches occur less frequently and are not found on successive axial cells.

DISTRIBUTION: Tropical and sub-tropical coasts of Queensland to 30 °S (King & Puttock 1989); Japan, south-east Asia, Oceania (Fiji, Tonga), Papua New Guinea (King 1990) and Kenya (Coppejans & Gallin 1989). Records from Nigeria are misidentifications (King & Puttock 1989).

Chondria C. Agardh

C. sedifolia Harvey

REPRESENTATIVE MATERIAL: Lopta, Rotuma [N'Yeurt, 10th Mar., 1992: USP 475].

DISTRIBUTION: Florida, USA (Dawes 1974: 155); Tanzania (Jaasund 1976: 135, fig. 273a, b: pl. 9); Philippines (Silva et al. 1987: 63); Rotuma.

Laurencia Lamouroux

L. corymbosa J. Agardh

[Garbary et al., 1991]

L. venusta Yamada

REPRESENTATIVE MATERIAL: Lopta, Rotuma [N'Yeurt, 10th Mar., 1992: USP S477].

DISTRIBUTION: Japan (Saito 1967: 14, pls. V and VI; text-figs. 8-14); Tanzania (Jaasund 1970a: 62, fig. 1B; 1976: 141, fig. 284); Australia (Lewis

¹ *Rhodolachne radicata*, described from Fiji by Itono (1985), is now not believed to be representative of the genus *Bostrychia*, and will be re-described (Raj 1993; King, pers. comm.).

1984: 61); Taiwan (Lewis & Norris 1987: 23); Philippines (Silva et al. 1987: 68); Rotuma.

Discussion

The total number of benthic marine algae now reported from Fiji is 383. A significant number of the new records listed here (38 taxa) have resulted from the first detailed phycological survey of the shallow-water algae of Rotuma (N'Yeurt 1993). Situated some 300 km N. of the main Fiji Group, Rotuma experiences a somewhat warmer and less contrasting seasonal climate. In addition, Littler & Littler (pers. comm.) reported that they discovered a substantial number of new records of benthic marine algae from Fiji (including a number of undescribed species) as a result of their 1992 survey of the Great Astrolabe Reef, Kadavu.

The Cyanophyceae listed here require substantial further work; preliminary studies indicate that the cyanophyte flora is very diverse indeed, and many species will be added to those already known from Fiji.

The Fijian marine algal flora includes many species that are characteristic of the Indo-West Pacific region, as well as a number that are pan-tropical or cosmopolitan. However, a number of the species recorded here suggest that our flora also has some unexpected disjunct northern hemisphere-southern hemisphere distributions. Examples are the occurrence of *Phaeophila dendroides* (Chlorophyceae) and *Rosenvingea orientalis* (Phaeophyceae). Other species, to date known only from their type localities, have been reported here (e.g. *Streblospora minutum* from Papua New Guinea; *Meristotheca procumbens* from Lord Howe Island). *Dictyotopsis propagulifera*, scarcely known before, is now reported to be a widespread species in the Fijian mangal (Raj 1993); the first report of this species from Fiji (Post 1967) was omitted in error by South & Kasahara (1992).

The Fijian flora at present includes no endemics. Several new species have been discovered, however, and are awaiting formal publication (Kasahara 1985, Littler & Littler, unpubl., South et al., unpubl.) and some of these may be endemic.

The rate of discovery of new records continues to be high, and as more surveys (particularly sub-tidal) are carried out many more species may be added to the flora. We estimate that approximately 65–70 percent of the flora is known.

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